DMSO

Industry Days
22-24 May 2000

-Panel-
"Use of M&S in Major Systems Acquisition"

RADM Kathleen K. Paige

Chief Engineer

Assistant Secretary of the Navy

(Research, Development & Acquisition)

System Engineering

It's About:

Understanding the Problem to be Solved and the Tools Available With Which to Solve the Problem

Building a Little, Testing a Little, Learning a Lot

Relationships and Teamwork

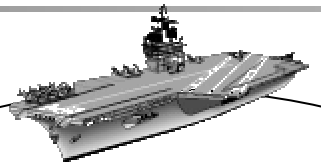
Details! Details! Details!

Turning Mission Needs and Concepts Into a Practical Reality

Navy Battlegroup Operations (1997-1998)

"…incoherent tactical picture for BG operators."

CINCLANFLT BGSIT 021731ZMar98



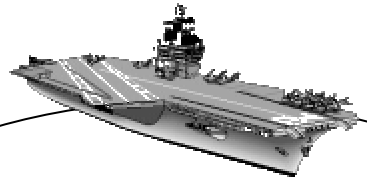
USS John F Kennedy
(CV 67)
ACDS Block 1 Level 2.1
CEC B/L 2

USS Mahan (DDG 72)
USS Barry (DDG 52)
AWS MK 7 B/L 5.3.6.3

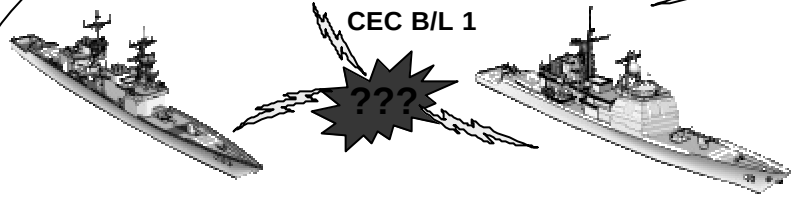
USS Hue City (CG 66)
USS Vicksburg (CG 69)
AWS MK 7 B/L 6 Ph 1
CEC B/L 2

JFK BG

???



USS Eisenhower (CVN 69)
ACDS Block 1 Level 2.0
CEC B/L 1



USS Mitscher (DDG 57)
USS Arleigh Burke (DDG 51)
AWS MK 7 B/L 5.0.Z5/5.3.5

USS Cape St. George (CG 71)
USS Anzio (CG 68)
AWS MK 7 B/L 5.C.5
CEC B/L 1

IKE BG

"… complex warfighting capabilities … significant battle group interoperability challenges."

CNO WASHINGTON DC 021648ZMay98

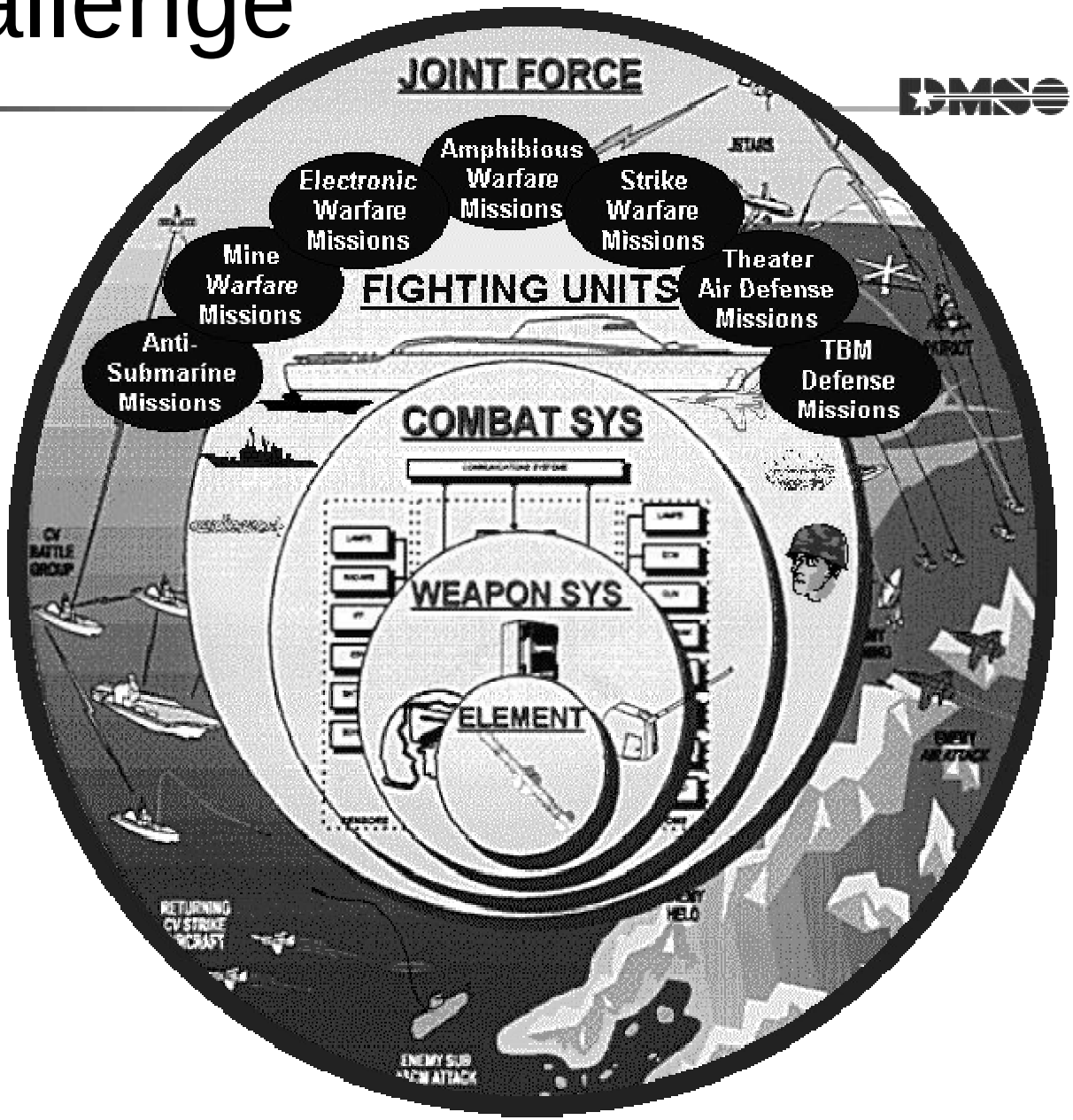
The Navy's Organizational Response

- PEO (Theater Air Defense) & PEO (AEGIS/Surface Combatants) Merged into Single PEO for Theater Surface Combatants – April 98
- CNO Designated NAVSEA (SEA05) as CNO Lead for Battle Group Interoperability – May 98
- OPNAV Initiates Integrated Warfare Architecture (IWAR) Process
- ASN(RDA) Designates Chief Engineer as Senior Technical Authority Within the Acquisition Structure
  - For the Overall Architecture, Integration and Interoperability of Current and Future Combat, Weapons and C4I Systems Used by the Department of the Navy – April 99
  - Also Designates Chief Technology Officer

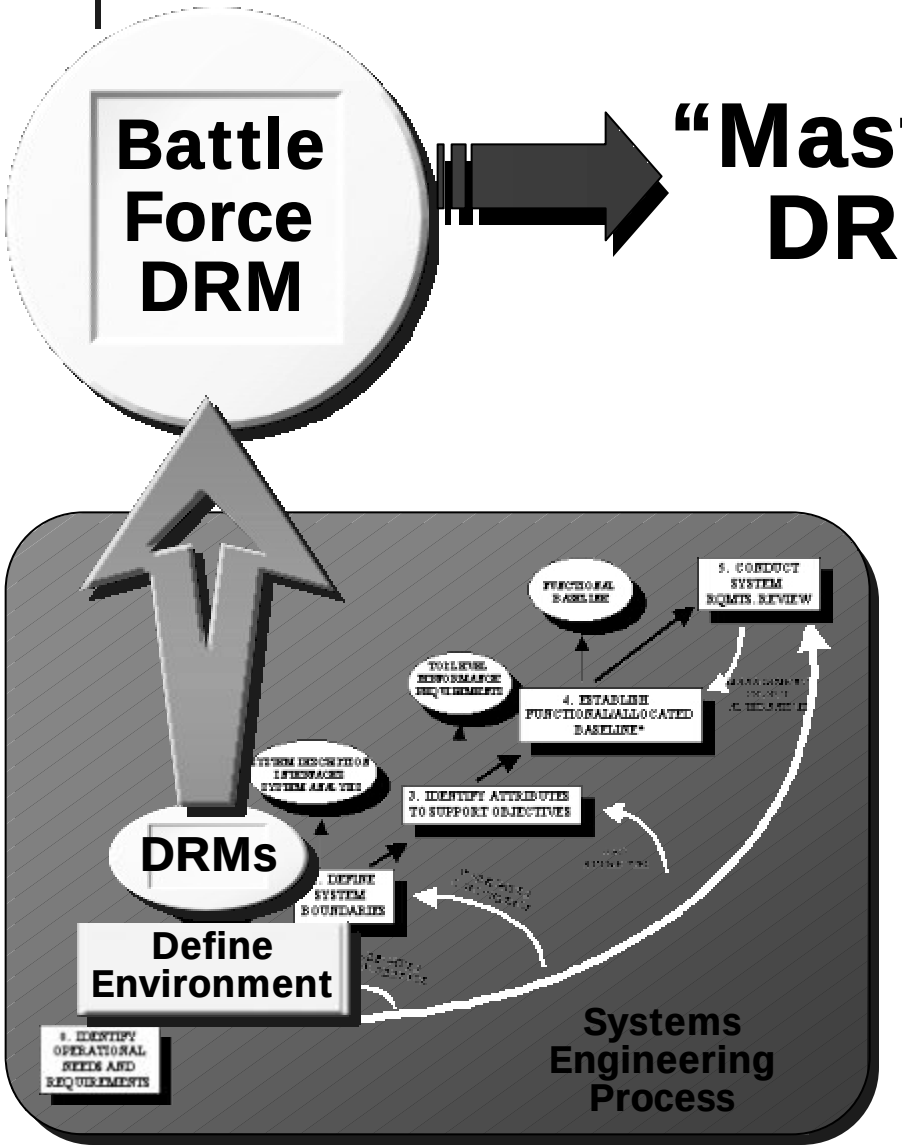
The Challenge

Systems Engineering & Management

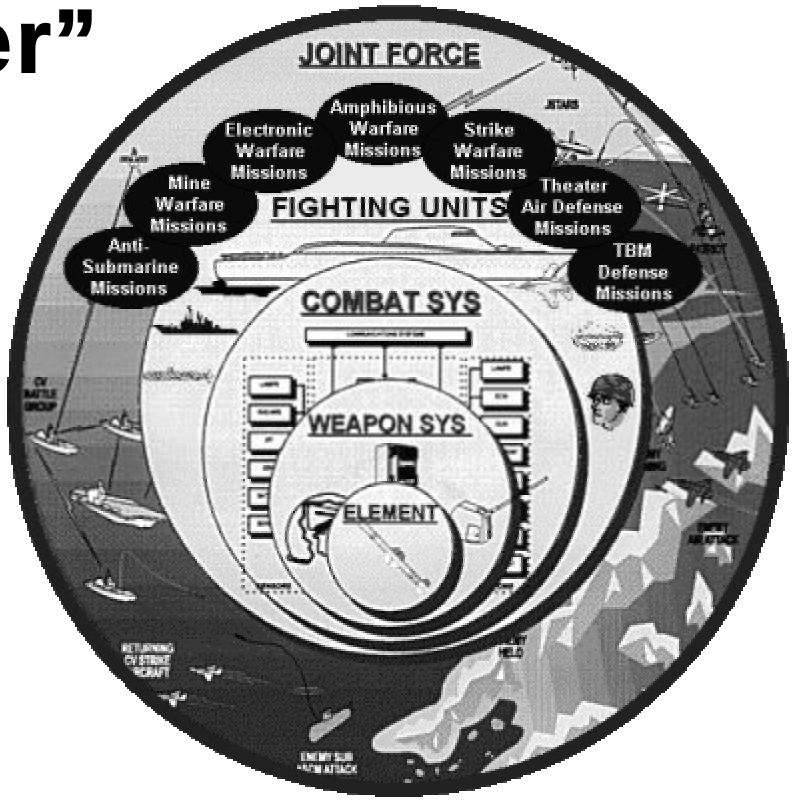
At All Levels



Design Reference Missions



"Master" DRM



Systems Engineering & Management At All Levels

Collaborative Engineering Environment

New Initiatives

AFRL Collaborative Enterprise Environment

Distributed Knowledge Environment

AF Distributed Mission Training

NRL Collaborative Engineering Environment BAA

DDR&E Collaboratory

NASA Integrated Synthesis Environment

Successful research

DARPA Simulation Based Design

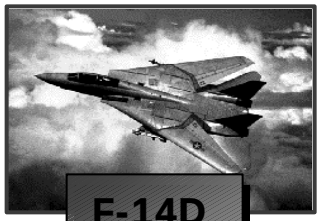
JDUPO AFRL Dual Use Collaborative Virtual Prototyping

SC 21 Manning Affordability Initiative Human Centered Design Environment

Builds on Existing Foundation

The **JDEP** of **Today…Tomorrow…**

DMSO



F-14D
PT Mugu

AEGIS CGs/DDGs
ATRC - Dahlgren

DEP Operations Center
NSWCDD - Dahlgren

E-2C MCU
NAWCAD - PAX River

Battle Group LINK Monitor
NCTSI

AWACS
Boeing-Seattle

SSN
NUWC

AEGIS CGs/DDGs
SCSC - Wallops Island

E-2C GII
SSC - San Diego SIF

SSDS
SCSC/ICSTF

Army PAC-3
Huntsville

AEGIS CGs/DDGs
NSWCDD - ACC

CV/CVNs, LHA/LHDs
ICSTF - San Diego

C4ISR
SSC-Charleston

CV/CVNs, LHA/LHDs, DD/FFGs
NSWCPHD / Dam Neck

PEO-TSC
HLA Pilot Program

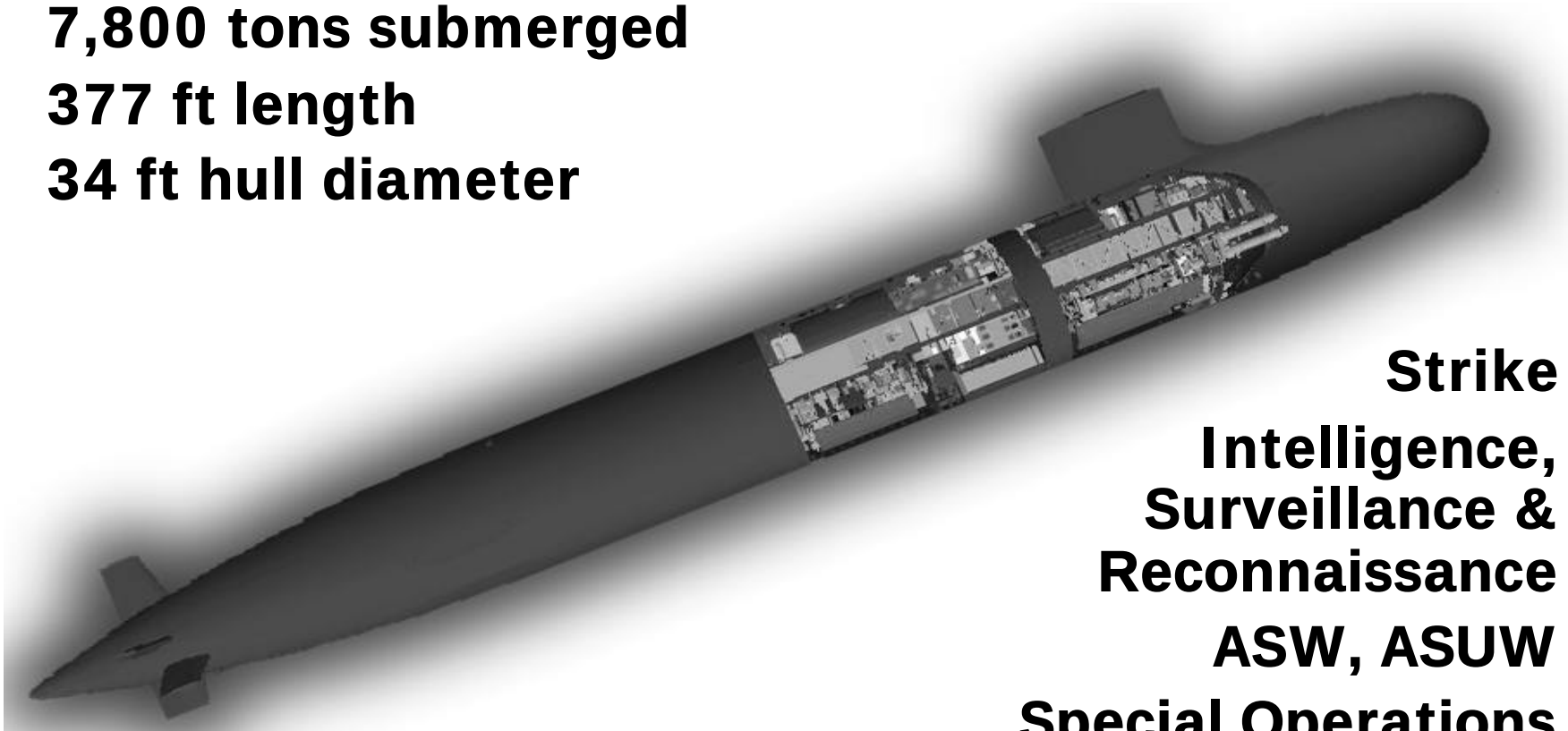
- **Consortium of Navy Labs and Industry**
- **End-to-end ship defense with hardkill/EW integrated in same simulation framework**
- **Tactical combat system code-in-the loop**
- **Operational threat – test target interchange**

Federation Development:
Accomplishments & Lessons Learned

- Synchronized, engineering-level HLA federations are feasible
  - Legacy simulations can be reasonably integrated as federates
- Operational software can be re-hosted and federated
  - RTI permits IDS-compliant system-to-system interactions
  - Mapping from real time to simulation time is challenging but achievable
- Federation development both requires and builds teams
  - FEDEP fosters collaboration

Virginia Class SSN

7,800 tons submerged
377 ft length
34 ft hull diameter

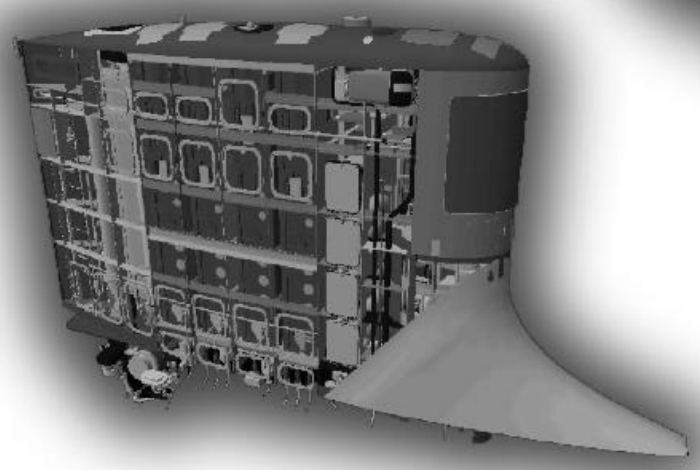


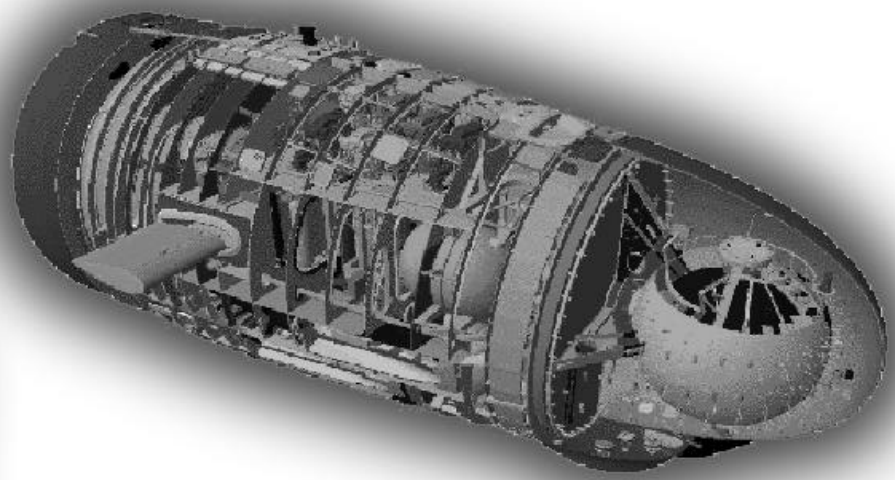
Strike
Intelligence, Surveillance & Reconnaissance
ASW, ASUW
Special Operations

“The Navy’s next-generation attack submarine”

The Ship Product Model

Sail Model

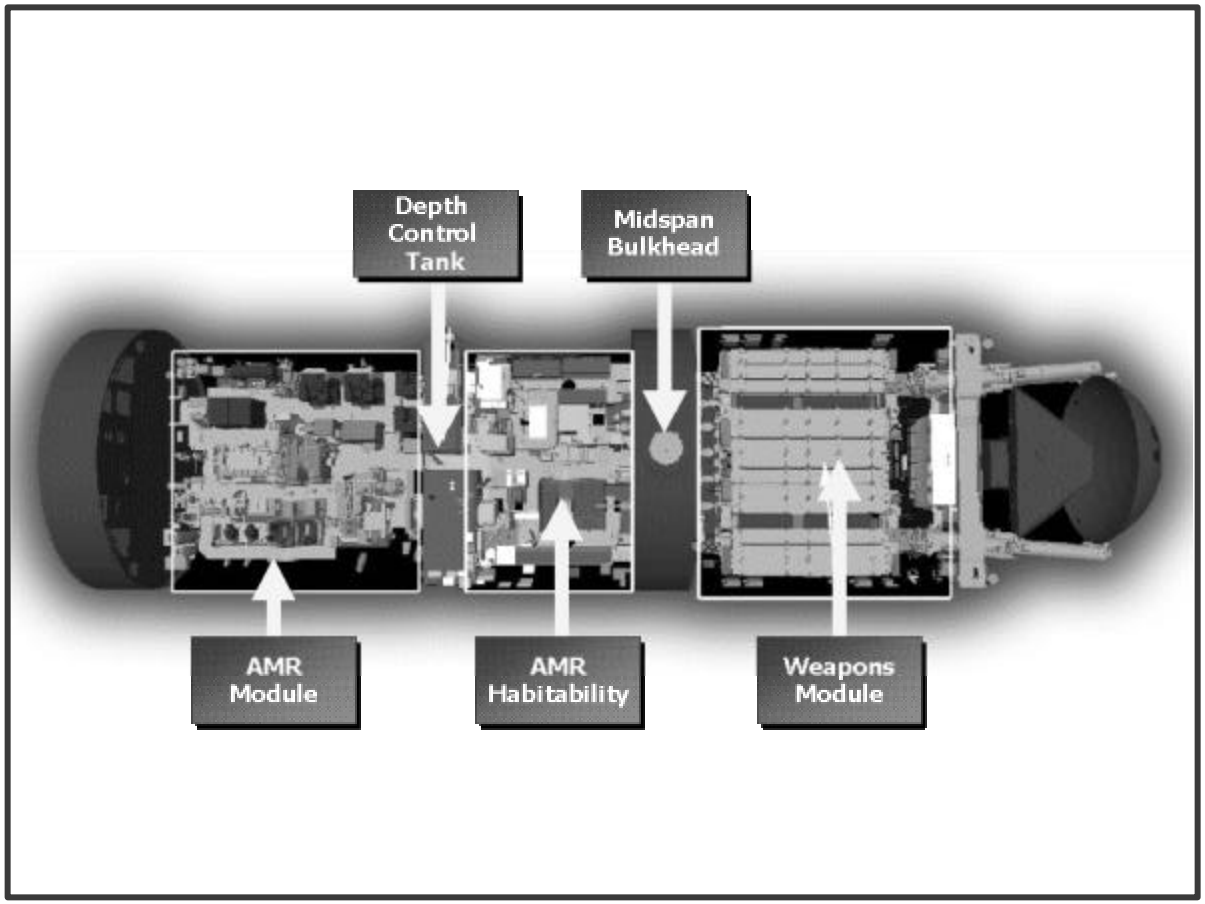




Non-Pressure Hull

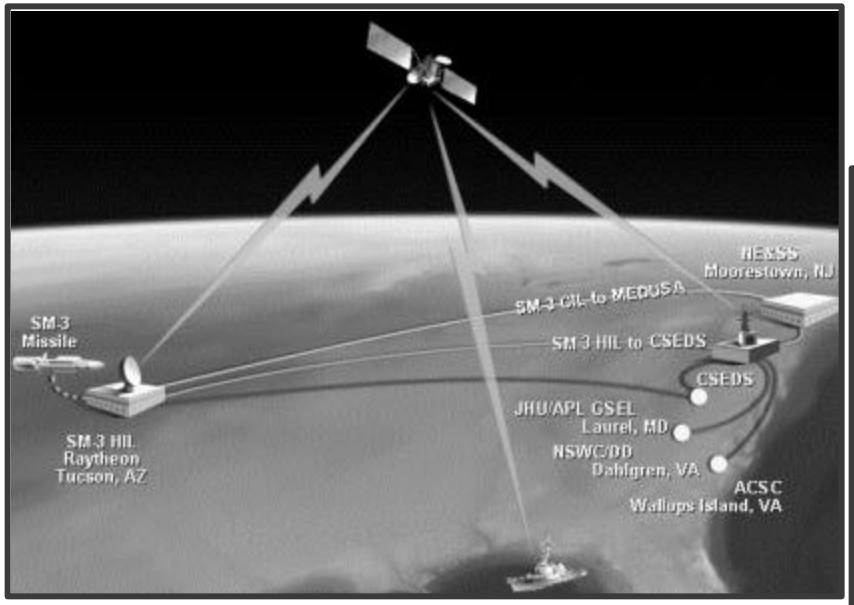
"Virginia is the first American warship designed solely by computer…"

Simulation-Enabled Acquisition



Habitation Compartment Walk-thru

Navy Theater Wide



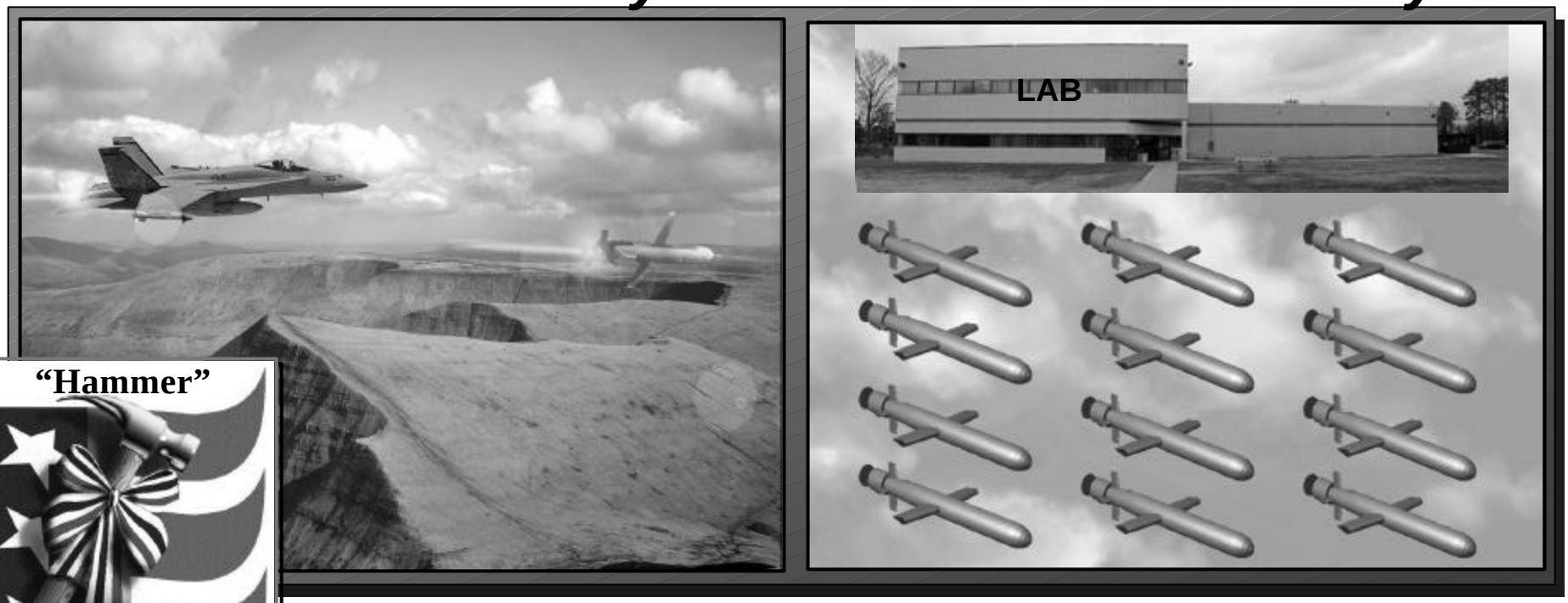
End-to-End Distributed Simulation

Scenario Visualization

M&S Supporting Risk Reduction

Tomahawk

1 Missile In 1 Day ***12 Missiles In 3 Days***



“Hammer”

“Award”

~$2000K ***~$35K***

COMOPTEVFOR Confidence for OPEVALS!!

Modeling and Simulation is Fundamental to the Process!